

[illegible]

~~Thru~~
osluir

° Type :- solid - solid - solid mixture

° Solubility Tests:

Tests	Observation	Inference
Take small amount of mixture + water shake & allow to stand	solid does not dissolve	water insoluble solid is present

Conclusion: All the compounds in the mixture are water insoluble solid

° Determination of chemical Type:-
(Three water insoluble solid compound)

Tests	Observation	Inference
i) About 0.01 g of mix + 1-2 cm ³ sat. NaHCO ₃ shake till effervescence stops. Filter	i) strong effervescence before filtrate with conc HCl → a solid reappears	carboxylic acid is present.
ii) Residue from test (i) washed to remove acid. Remaining residue + 2 cm ³ of 10% NaOH. shake & filter.	Acidifying filtrate with 1:1 HCl & cooling → a solid reappears	phenolic compound is present
iii) Residue from test (ii) washed with NaOH remove phenol. residue + 2 cm ³ 1:1 HCl shake & filter	Filtrate cooled in ice + 20% NaOH & cool in ice bath → No solid reappears	Base compound is absent

iv	Residue washed 2-3 times aq. HCl to remove base. Remaining residue is insoluble in all above reagents.	Neutral compound is present.
----	--	------------------------------

Conclusion :- chemical type of given mixture is

- Water insoluble acid solid.
- Water insoluble phenol solid.
- Water insoluble neutral solid.

• separation of solid - solid - solid mixture :

A - separation method :-

Mixture + saturated NaHCO_3

Filtrate	Residue
- Filtrate + HCl → solid reappears - Water insoluble Acid	- Residue + NaOH - water insoluble phenol Filtrate + HCl → solid reappears - water insoluble neutral

B. Yield of the separating compound :-

- Weight of water insoluble Acid = 0.9 g
- Weight of Water insoluble phenol = 0.7 g
- Weight of Water insoluble Neutral = 0.9 g

• Identification of organic compound :-
(Water insoluble Acid)

Tests	Observations	Inferences
Nature	Solid	Carbohydrates, acid, etc. may be present.
Colour	White	Carbohydrates, Acid amides, etc. may be present.

EXPERIMENT:

No.

Date / /
Page 2

Odour	Pungent & irritating	Acetic acid, benzoic Acid etc. may be present.
Ignition test:- Heat compound on an oxidised copper foil	Sooty flame is observed	Aromatic compound or aliphatic comp contain more than four carbon atom
Test for unsaturation: KMnO₄ Test:- Add few drops of dilute KMnO ₄ to small amount of compound & shake	Decolourisation	unsaturated or easily oxidisable compound may be present.

- Detection of elements (N, S & Halogens):-
preparation of Lassaigne filtrate (sodium fusion extract):-
- i) Heat a small amount of sodium metal piece in dry fusion tube till it melts.
- ii) Add small amount of dry substance of molten sodium
- iii) After initial reaction has subsided, Heat the fusion tube further to red heat & then drop it in 5 cm³ of distilled water taken in porcelain dish covering it immediately with an asbestos sheet.
- iv) carry out two more fusion in the similar way & concentrate the contents of the dish to half its volume.
- v) cool & filter, Test the filtrate for litmus action At this stage, it should be basic.
- vi) Test the filtrate for the detection of elements.

Teacher's Sign:

Tests	Observation	Inference
0.5 cm ³ Fehling's solution freshly prepared and boiled cool & add excess of H ₂ O do it.	No green coloured is observed	Nitrogen is absent.
0.5 cm ³ Fehling's solution + 2-3 drop of 5% sodium nitroprusside solution	No violet colour is observed	Sulphur is absent.
0.5 cm ³ Fehling's solution + conc. HNO ₃ + AgNO ₃ solution	precipitate is not obtained	Halogen is absent.

Conclusion:- The given compound contains C, H, [O] elements.

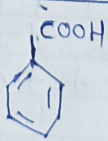
• Determination of the functional group of compound:-

Group I:- compounds containing C, H, [O] elements:-

Tests	Observation	Inferences
Test for carboxylic acid groups: i) compound + sat NaHCO ₃	Soluble with brisk effervescence	Carboxylic acid - COOH present.
ii) compound + H ₂ O + few drop of neutral FeCl ₃ solution.	Buff colour	Benzoic acid is present.

Conclusion:- The given compound contains Ar-COOH functional group.

• Physical constant:-

Melting point	Name and structure of the compound
121°C	Benzoic acid 

EXPERIMENT:

No.

Date / /

Page 3

- Identification of organic compound :-
(Water insoluble phenol)

- Preliminary test :-

Test	Observation	Inference
Nature	Solid	carbohydrate, phenol acids etc. may be present.
Colour	Buff	Amino, phenols, Naphthols amines etc may be present
Odour	Carbolic	phenols & naphthols may be present.
Ignition Test:-		Aromatic or aliphatic compound containing more than 4 carbon atoms.
Heat compound on an oxidised copper foil.	sooty flame is observed	
Test for unsaturation		unsaturated or easily oxidisable
kmno ₄ Test:		
Add few drops of kmno ₄ to small amount of compound & shake.	Decolourisation	compound may be present.

- Detection of elements (N, S & Halogens) :-

Preparation of Lassaigne Filtrate (Sodium fusion extract)

- Heat a small piece of sodium metal in dry fusion tube
- Add small amount of dry substance to molten sodium
- After that Heat & the tube to red Heat & then drop in distilled water taken in porcelain dish covering it immediately with asbestos sheet.

iv) carry out two more fusion in similar way & concentrate the content of dish to half in volume.

v) cool & filter. Test the filtrate for litmus action, it should be basic.

vi) Test the filtrate for the detection of elements.

Tests	Observation	Influence
0.5 cm ³ filtrate + freshly prepared sat. FeSO ₄ sol ⁿ & cool & add excess of dil. H ₂ SO ₄	No blue colour is observed	Nitrogen is absent.
0.5 cm ³ filtrate + drops of 5% sodium metavanadate	No violet colour is observed	Sulphur is absent.
0.5 cm ³ filtrate + conc. HNO ₃ Add AgNO ₃ sol ⁿ	precipitate is not obtained	Halogen is absent.

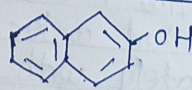
Conclusion:- The given compound contains C, H, [O] elements.

• Determination of the functional group of compound:-

Group I :- compounds containing C, H, [O] elements:-		
Tests	Observation	Inference
Test for phenolic group		
i) compound + NaOH solution	Easily soluble	phenolic - OH present.
ii) compound + H ₂ O + drops of alcoholic FeCl ₃ solution	Buff precipitate	phenolic - OH present

Conclusion:- The given compound contains phenol group.

• physical constant:-

Melting point	Name & structure of compound
123°C	β-naphthol 

EXPERIMENT:

No.

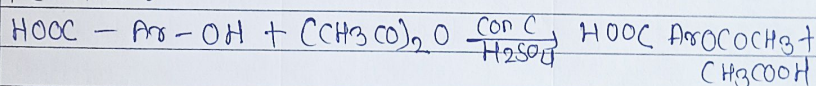
Date / /
Page 24

Derivative of Water Insoluble Acid :-
(Acetyl derivative of hydroxy Acid) :-

• procedure :

- Take 1 g of compound in dry test tube.
- Add 2 cm³ of acetic anhydride & 1 drop of conc H₂SO₄ to it.
- Heat to boiling, cool & pour the content into 10 cm³ of cold water in a dish.
- If solid does not separate out, Heat for 2 min more cool and shake well.
- Filter the solid product, wash with water.
- Dry & determine the melting point.

• Reaction :



• Physical constant :

The melting point of acetyl derivative of hydroxy acid is 123°C

• purification of compound :

- purified compound : Water insoluble Neutral
- Method of purification : Recrystallization
- yield of purified product : 0.7 g

iv) melting point of product : 80°C


EXPERIMENT:

No.

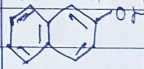
Date / /
Page 5

• Results :

• Identified compound :

Compound identification	Elements detected	Functional Group	Physical constant	Name & Structure of compound	Derivative prep with melting point.
Water Insoluble Acid	Carbon C, Hydrogen H, Oxygen (O)	Ar-COOH	Melting Point = 121°C	Benzoic Acid 	Acetyl derivative of Hydroxy acid Melting point = 123°C

• Identified compound :-

Compound identification	Elements detected	Functional Group	Physical constant	Name & Structure of compound
Water Insoluble phenol	Carbon C, Hydrogen H, Oxygen (O)	phenol	Melting point = 123°C	β -naphthol 

• purified compound :-

purified compound	Yield of compound	physical constant
Water Insoluble Neutral	0.7 g	Melting point = 80°C

Figure

Type : Solid-Solid-Solid mixture

Solubility Test :

Tests	Observation	Inference
i) Take small amount of mixture + water shake & allow to stand	Solid does not dissolve	water insoluble Solid may be present.
ii) Aqueous layer from above test, heat in porcelain dish till water gets evaporate	Solid reappears	water insoluble Solid is present

Conclusion :- In the given mixtures, there is one water soluble solid & two water insoluble solid.

For water soluble solid,

Molish Test :

Aqueous layer from above test + α -naphthol in ethanol + 6 drop of conc. H_2SO_4	Ring is formed	Carbohydrates is present
---	----------------	--------------------------

Determination of chemical type :

(one water soluble solid + 2 water insoluble solid)

Test	Observation	Inference
For water soluble solid : 0.01 g mix + H_2O shake & filters		
i) Filtrate + sat $NaHCO_3$	No effervescence	carboxylic acid absent

Teacher's Sign

i) Filtrate + aq. FeCl ₃ sol ⁿ	No violet colour	phenol absent
iii) Filtrate + red litmus	No change	Base absent
iv) none of above test is positive	-	Neutral Compound is present
For waters insoluble solid		
i) mixture + sat. NaHCO ₃ shake till effervescence stop filters	on acidifying with conc. HCl → a solid does not reappear	carboxylic acid absent
ii) Residue from above test washed 2-3 times with NaHCO ₃ . Residue + 10% NaOH. shake & filters	on acidifying with HCl & cooling → solid reappears	phenolic compound is present
iii) Residue from above test washed with NaOH to remove phenol. Residue + 1:1 HCl. Shake well & filters	Filtrate cooled in the ice + 20% NaOH drop by drop till alkaline → solid reappears	Basic compound is present

Conclusion : chemical type of given mixture is

- waters soluble Neutral solid
- waters insoluble phenol solid
- waters insoluble Base solid

Separation of solid-solid mixture :
A. separation method :

Mixture + diethyl ether

Filtrate

- Evaporate the filtrate
→ Solid reappears
- waters Soluble neutral

Residue
- Residue + NaOH
Filtrate
- Filtrate + HCl
→ solid reappears
- waters Insoluble Phenol

Residue
- water Insoluble Base

B. Yield of the separating compound :-

- i) weight of water soluble solid neutral = 0.9 g
- ii) weight of water Insoluble phenol = 0.7 g
- iii) weight of water Insoluble Base = 0.8 g

• Identification of organic compound : I
(water Insoluble phenol)

Tests	Observations	Inferences
Nature	Solid	Carbohydrates, phenols, acids, amides etc.
Colour	Buff or reddish brown	may be present. Amino phenol, amino acids, amines etc.
Odour	Carbolic	phenols & naphthol
Ignition Test		Aromatic are aliphatic
Heat compound on an oxidised copper foil	sooty flame	Containing more than four carbon atoms.
Test for unsaturation kmno ₄ test:		Unsaturated or easily oxidisable
Add few drops of dilute kmno ₄ to small amount of the compound & shake	Decolourisation	Compound may be present.

• Detection of elements (N, S, & halogen) !

- Preparation of Lassaigne Filtrate (Sodium fusion Extract)
- i) Heat small piece of sodium metal in fusion tube till it melts.

i) Add small amount of dry substance to molten sodium
 ii) Heat fusion tube till it turns red hot & then drop in
 distilled water taken in porcelain dish to half covering
 in immediately with an abbe's sheet.

iii) Concentrate the content to half its volume.

iv) Cool & filter. Test the filtrate for litmus action it should
 be basic.


v) Use the filtrate for further tests :

Tests	Observations	Inferences
0.5 cm ³ filtrate + sat. FeSO ₄ , boil, cool & add. excess of dil. H ₂ SO ₄	No blue colour	Nitrogen absent
0.5 cm ³ filtrate + 5% of sodium nitroprusside solution	No violet colour	Sulphur absent
0.5 cm ³ filtrate + conc. HNO ₃ . Add AgNO ₃	No precipitate	Halogen absent

Conclusion : The given compound contains C, H, Cl elements.

• Determination of functional group of compounds :

Group I : compound containing C, H, Cl elements.

Tests	Observations	Inferences
Test for phenolic groups: i) Compound + NaOH	Easily soluble	phenolic -OH present
ii) Compound + H ₂ O + drop of alcoholic FeCl ₃	Buff precipitate	phenolic -OH present
Conclusion : The given compound contains phenolic group		
Physical constant		
Melting point	Name and structure of the compound	
129°C	β-naphthol	
		

• Identification of organic Compound : II
(water Insoluble Base)

Tests	Observations	Inferences
Nature	Solid	Carbohydrates, phenols, acids, amines, etc. may be present.
Colour	yellow	Nitro compounds, diketones, etc.
Odour	Fishy	Amines, aniline, etc.
Ignition Test : Heat compound on oxidised copper foil	Sooty flame	Aromatic or aliphatic compound containing more than four carbon
Test for unsaturation		
Kmno ₄ Test : Add drops of dil. kmno ₄ to small amount of compound & shake	Decolourisation	unsaturated or easily oxidisable compound may be present.

- Detection of Elements (N, S and halogen)
Preparation of Lassaigne filtrate (Sodium fusion Extract):
 i) Heat small piece of sodium metal in dry fusion tube till it melts.
 ii) Add small amount of dry substance to molten sodium.
 iii) After initial reaction, heat it to red hot & drop in distilled water taken in porcelain dish covering immediately with asbestos sheet.
 iv) Carry out two more & concentrate the content of the dish to half its volume.

✓ cool & filter test filtrate if it is basic.
 vi) use filtrate for following reactions.

Tests	Observations	Inferences
0.5 cm ³ filtrate + Fresh FeSO ₄ , boil, cool & add excess of dil. H ₂ SO ₄	Green colour	Nitrogen Present
0.5 cm ³ filtrate + 5% Sodium nitroprusside solution	No violet colour	Sulphur absent
0.5 cm ³ filtrate + conc HNO ₃ + AgNO ₃ solution	No precipitate	Halogen absent

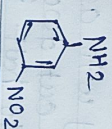
Determination :- the given compound contain C, H, [O] & N elements.

• Determination of functional Group of compound :-
 Group II : Compounds containing C, H, [O] & N elements.

Tests	Observations	Inference
Test for Amines Dissolve compound in dil. HCl, cool in ice + acid 2% NaNO ₂ soln.	A clear solution which when added to sol ⁿ of β-naphthol in NaOH give orange red dye	Aromatic primary amino (C-NH ₂) group present.

Conclusion :- The given compound contain aromatic primary amine group.

• Physical constant :

melting point	name & structure of the compound
114°C	m-nitro aniline 

EXPERIMENT:

No.

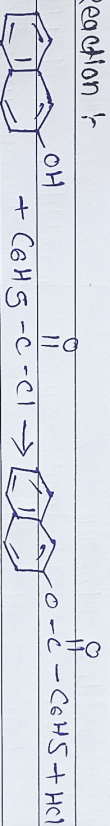
Date
Page

- Derivative of water insoluble phenol :-
(Benzoyl derivative of phenol) :-

- procedure :-

- 1) Dissolve 0.5 cm³/g of compound in 10 cm³ of 10% NaOH in a 100 cm³ conical flask.
- ii) Add 1 cm³ of benzoyl chloride to it & cork flask
Shake flask vigorously till the smell of benzoyl chloride disappears completely.
- iv) Filter the solid under suction & wash it first with dil. HCl & then with water.
- v) Recrystallise the product from alcohol. Dry & determine the melting point.

- Reaction :-



- Physical constant :-

the melting point of benzoyl derivative of phenol is 107°C.

- Purification of Compound :-

iv) purified compound : water soluble Neutral

- ii) method of purification : Recrystallization

- iii) weight of purified product : 0.8 g

Gulshan®

Teacher's Sign.

iv) melting point of product :- 146°C

1) react substance added to water

2) (react) to water (hydrolysis)

3) product

1) react substance added to water

2) (react) to water (hydrolysis)

3) product

1) react substance added to water

2) (react) to water (hydrolysis)

3) product

1) react substance added to water

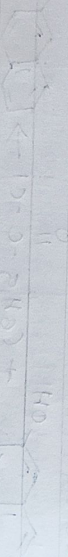
2) (react) to water (hydrolysis)

3) product

1) react substance added to water

2) (react) to water (hydrolysis)

3) product



1) react substance added to water

2) (react) to water (hydrolysis)

3) product

1) react substance added to water

2) (react) to water (hydrolysis)

3) product

1) react substance added to water

2) (react) to water (hydrolysis)

3) product

1) react substance added to water

2) (react) to water (hydrolysis)

3) product

1) react substance added to water

2) (react) to water (hydrolysis)

3) product

1) react substance added to water

2) (react) to water (hydrolysis)

3) product

1) react substance added to water

2) (react) to water (hydrolysis)

3) product

1) react substance added to water

2) (react) to water (hydrolysis)


EXPERIMENT:

No.

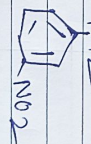
Date / /
Page 10

Results :-

Identification Compound : I

Compound	Elements	Functional Group	Physical Constant	Name & structure	Derivative Preparation with melting point
Identification	Detected	Group	Constant	Structure & melting point	
soluble	Carbon C,	phenolic	melting point	B-naphthol Benzyl derivative	
Insoluble	Hydrogen H, (-OH)				
phenol	oxygen(O)	group	=128°C		melting point = 107°C

Identification Compound : II

Compound	Elements	Functional Group	Physical Constant	Name & structure
Identification	Detected	Group	Constant	Structure of compound
soluble	Carbon C, Aromatic		melting point	m-nitroaniline
Insoluble	Hydrogen H, primary			
Base	oxygen(O) amino		114°C	
	Nitrogen N (-NH ₂)	Group		

• purified compound

purified compound	yield of compound	physical constant
acids Soluble		
neutral	0.8 g	melting point = 146°C

Suman

Teacher's Sign.

Type : Solid - Liquid mixture

Solubility test :

Tests	Observations	Inferences
i) mixture + H ₂ O Shake well & allow to stand	a) solid does not dissolve b) No layers formed	waters insoluble solid present.. waters miscible liquid present.
ii) Aqueous layer formed above test is heated till the liquid evaporate	solid not reappears	waters insoluble solid present.

Conclusion : The compounds in the mixture are waters
insoluble solid, waters insoluble solid &
waters miscible liquid

Determination of chemical type :

(waters Insoluble solid + waters insoluble solid + waters
miscible liquid)

Tests	Observation	Inferences
For waters insoluble Solid		
i) 0.01 g of mix + sat NaHCO ₃ shake till the effervescence stops filter	Acidifying with HCl → solid reappears	Carboxylic acid is present
ii) Residue from above Test washed 2-3 times with NaHCO ₃ No remove	No solid reappears	Phenol absent

acid Residue + 10% NaOH Shake filters			Neutral compound is present
i) Residue washed 2-3 times with aq. HCl to remove base. Residue is insoluble in all above reagents	-		
ii) Residue from above test washed 2-3 times with NaOH to remove phenol. Residue + 1:1 HCl Shake & filters	No solid reappears		Base absent
iii) For waters miscible liquid i) water extract (WE) + sat. NaHCO ₃	No effervescence		carboxylic acid absent.
ii) WE + aq. FeCl ₃	No violet colour		phenol absent
iii) WE + red litmus papers	papers not turn blue		Base absent
iv) None of the above tests is positive	-		Liquid is water miscible neutral.

Conclusion :- chemical type of given mixture is

- i) water Insoluble Acid
- ii) water Insoluble Neutral
- iii) water miscible Liquid

• separation of solid - solid - liquid mixture :-

A. Separation method :-

Distillation

In Distillation flask

- Insoluble solid

- Insoluble solid + sat. NaHCO₃

↓
Filtrate

- Filtrate + conc. HCl

- Solid reappears

- water Insoluble acid

↓
Residue

- water Insoluble

Neutral

In collector flask

- Volatile liquid

- water miscible

- Neutral liquid

B. yield of the separating compound :-

- i) weight of water Insoluble Acid = 0.9 g
- ii) weight of water Insoluble Neutral = 0.7 g
- iii) weight of water miscible liquid = 2.5 ml

Identification of organic compound : I
(water Insoluble Neutral)

• Preliminary Test :

Tests	observation	Inferences
Nature	Solid	Carbohydrates, acid amines, etc. may be present.
Colour	white	Carbohydrates, aromatic, amides, aromatic hydrocarbon etc.
Odours	Flowity	Aromatic hydrocarbon esters etc.
Ignition Test :- Heat the compound on oxidised copper foil.		
Test for unsaturation		
kmno ₄ Test :- Add. dil kmno ₄ to small amount of compound & shake.	Decolourisation	unsaturated or easily oxidisable compound may be present.

• Detection of Elements (N, S & Halogen) :

preparation of Lassaigne Filtrate (Sodium fusion extract) :-

- i) Heat small piece of Sodium metal in dry fusion tube.

Teacher's Sign:

til it melts.

- ii) Add small amount of compound to the molten solution.
iii) After initial reaction, heat the fusion tube to red heat & drop in distilled water taken in porcelain dish covering it immediately with asbestos sheet.
iv) Carry two more fusion & concentrate the content to half to volume.
v) Cool & filter. Test filtrate the litmus action. It should be blue.
vi) Test the filtrate for following reactions.

Tests	Observation	Inferences
0.5 cm ³ filtrate + freshly FeSO ₄ , boil, cool & add excess of dil. H ₂ SO ₄	No green colour	Nitrogen absent
0.5 cm ³ filtrate + 5% sodium nitroprusside	No violet colour	Sulphur absent
0.5 cm ³ filtrate + conc. HNO ₃ Add AgNO ₃	No precipitate	Halogen absent

Conclusion :- The given compound contain C, H, Cl elements.

Determination of functional group of compounds :-

Group I : Compounds containing C, H, Cl elements :

Tests	Observations	Inferences
Test for hydrocarbon Iodine Test ; Dissolve 2-3 drops or 0.02 g compound in benzene + 2 cm ³ dil. I ₂ in benzene. Shake	Solutions remain violet in colour	Hydrocarbon present

Conclusion :- The given compound contain hydrocarbon functional group.

EXPERIMENT: No. 13

Date / /
Page 13

Physical constant

melting point

Name & structure of the compound

70°C

Diphenyl



Identification of organic compound : II

(waters miscible neutral)

• Preliminary Tests :

Tests	Observation	Inferences
Nature	liquid	carbohydrates absent alcohol, ketones, etc.
Colours	white	may be present. ketones, alcohols, esters, lactoses, etc.
Odours	pleasant	Alcohols, etc.
Ignition Test :		Aromatic or aliphatic
Heat compound in an oxidised copper foil	sooty flame	Compound containing more than four carbon
Test for unsaturation		
kmno ₄ test :		
Add dil. kmno ₄ to small amount of compound & shake	No decolourisation	Saturated compound Present

• Detection of Elements (N, S & halogen) :

preparation of Lassaigne filtrate (Sodium fusion extract)

i) Heat small amount of sodium in dry fusion tube till it melts.

ii) Add the compound to it (if liquid, 2-3 drops).

Teacher's Sign:

Signature

- iii) After the initial reaction, heat the fusion charge to red heat and drop it in distilled water taken in porcelain dish and covering immediately with asbestos sheet.
- iv) Carry two more fusion & concentrate the content of dish to half its volume.
- v) cool & filter. Test the filtrate for litmus action. It must be basic.
- vi) Use filtrate for further test:

Tests	Observation	Inference
0.5 cm ³ filtrate + Fresh sat. FeSO ₄ , boil, cool & excess of dil. H ₂ SO ₄	No green colour	Nitrogen absent
0.5 cm ³ filtrate + 5% of sodium nitroprusside	No violet colour	Sulphur absent
0.5 cm ³ filtrate + conc. HNO ₃ Add AgNO ₃	No precipitate	Halogen absent

Conclusion: The given compound contain C, H, [O] elements

Determination of functional group of compounds:-

Group I: Compounds containing C, H, [O] elements:

Tests	Observation	Inferences
Test for alcohols:- Compound (if liquid) in dry test tube + sodium metal	Effervescence due to formation of H ₂ gas.	Alcoholic -OH group present.

Conclusion: The given compound contain Alcohol functional group.

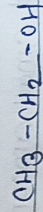
Physical constant:-

Melting point

67.8°C

Name & structure of the compound

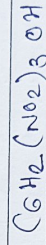
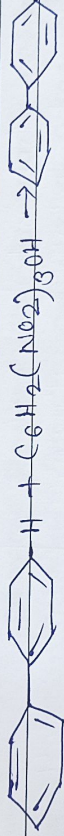
Ethyl alcohol



Derivative of water insoluble Neutral :-
(picric acid derivative of Hydrocarbon):

- procedure :-
- i) Dissolve 0.5 g of compound in 1 cm³ of benzene in dry test tube & add 1 cm³ of saturated solution of picric acid in benzene
- ii) Shake and warm the mixture of necessary on hot water bath. Cool it to room temp.
- iii) The product separates out. Filter it & wash it with few drops of benzene
- iv) Dry by pressing filter paper & determine the melting point.

• Reaction :-



• Physical constant

The melting point of picric acid derivative of hydrocarbon is 220°C.

• Purification of compound :-

- i) purified compound : water insoluble Acid
- ii) Method of purification : Recrystallization
- iii) Solvent used for purification : water
- iv) yield of purified product : 0.8 g

→ melting point of purified product: 121°C

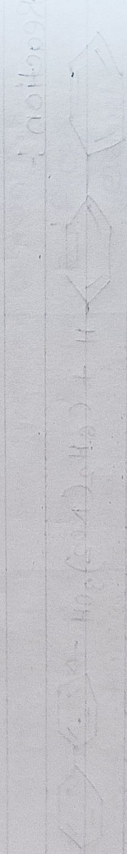
• fraction solvent added to extract
(Crystallization of 4-hydroxybenzoic acid)

• solvent: 2.0 ml
• solvent: 2.0 ml
• solvent: 2.0 ml
• solvent: 2.0 ml

• solvent: 2.0 ml
• solvent: 2.0 ml
• solvent: 2.0 ml
• solvent: 2.0 ml

• solvent: 2.0 ml
• solvent: 2.0 ml
• solvent: 2.0 ml
• solvent: 2.0 ml

• solvent: 2.0 ml
• solvent: 2.0 ml
• solvent: 2.0 ml
• solvent: 2.0 ml



• fraction solvent
• solvent: 2.0 ml
• solvent: 2.0 ml
• solvent: 2.0 ml

• solvent: 2.0 ml
• solvent: 2.0 ml
• solvent: 2.0 ml
• solvent: 2.0 ml

• solvent: 2.0 ml
• solvent: 2.0 ml
• solvent: 2.0 ml
• solvent: 2.0 ml

• solvent: 2.0 ml
• solvent: 2.0 ml
• solvent: 2.0 ml
• solvent: 2.0 ml

• solvent: 2.0 ml
• solvent: 2.0 ml
• solvent: 2.0 ml
• solvent: 2.0 ml

• solvent: 2.0 ml
• solvent: 2.0 ml
• solvent: 2.0 ml
• solvent: 2.0 ml

• solvent: 2.0 ml
• solvent: 2.0 ml
• solvent: 2.0 ml
• solvent: 2.0 ml

• solvent: 2.0 ml
• solvent: 2.0 ml
• solvent: 2.0 ml
• solvent: 2.0 ml

EXPERIMENT:

Results :-

Identified Compound : I

compound	Elements Detected	Functional Group	physical constant	Name & Derivative pre-
Identifcation				structure parction with
				of compound melting point
waters	Carbon C, Hydrogen H	Hydro Carbon	melting point = 70°C	Diphenyl picrate deriva-
Insoluble	Hydrogen H	Carbon	point	tive of Hydro-
Neutral	oxygen (O)			carbon melting point = 226°C.

Identified compound : II

compound	Elements Detected	Functional Group	physical constant	Name & structure of compound
Identifcation				
waters	Carbon C, Hydrogen H	Alcoholic (-OH) group	melting point = 78°C	Ethyl alcohol
miscible	Hydrogen H			C ₂ H ₅ -OH
Liquid	oxygen (O)			

purified compound

purified compound	yield of product	physical constant
waters Insoluble		melting point = 121°C.
Acid	0.8 g	

Teacher's Sign:

Type: Solid-Solid-Liquid mixture

Solubility Test:

Tests	Observation	Inferences
i) Mixture + H ₂ O shaken well & allowed to stand	a) Solid does not dissolve b) Two layers are formed	water Insoluble Solid Present water Immiscible Liquid Present
ii) Aqueous layer from above test is heated till all liquid evaporates	Solid reappears	water Soluble Solid Present

Conclusion: The compounds in the given mixture are water Insoluble solid, water Soluble solid & water Immiscible liquid.

Determination of chemical type:

(water Insoluble solid + water Soluble solid + water Immiscible liquid)

Tests	Observations	Inferences
For water Insoluble Solid		
i) 0.01 g of mixture + sat. NaHCO ₃ . Shake well till effervescence stops filter.	Strong effervescence before filtration Acidifying filtrate with conc. HCl → a solid reappears	Carboxylic acid is Present Carboxylic acid is confirmed
For water Soluble Solid		
0.01 g mixture + H ₂ O		

Teacher's Sign.

Signature

Shake & Filter Filterate + Sat. NaHCO_3	Effervescence	Water Soluble Carboxylic acid is present
For water immiscible Liquid		
i) Liquid + sat. NaHCO_3 Shake. Two layers formed	No effervescence No two layers	Carboxylic acid absent
ii) Liquid + dil. NaOH excess Shake. Two layers formed	Aqueous layers + 1:1 HCl fill acidic \rightarrow no two layers	phenol is absent
iii) Liquid + 1:1 HCl . Shake Well two layers formed	Aqueous layers + 20% $\text{NaOH} \rightarrow$ No emulsion	Base is absent
iv) All the above tests are negative		The liquid is neutral Compound

Conclusion: Chemical type of given mixture is

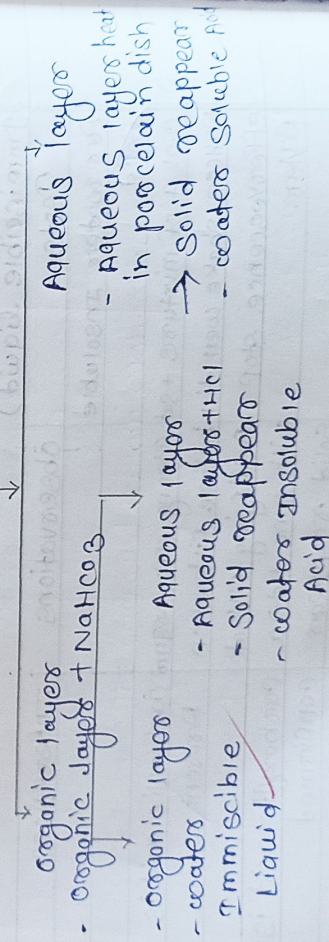
- water Insoluble Acid
- water Soluble Acid
- water Immiscible Neutral

• Separation of solid - Solid-Liquid mixture:-

A. Separation method:-

In separating funnel

Mixture + H_2O



B. Yield of the separating compound:
 i) weight of waters Insoluble Acid = 0.7 g
 ii) weight of waters Soluble Acid = 0.8 g
 iii) volume of waters Immiscible Neutral = 3.5 ml

• Identification of organic compound: I
 (waters Insoluble Acid)

• Preliminary Test:

Tests	Observations	Inferences
Nature	Solid	Carbohydrates, acid, ketone, amide, etc. may be present
Colours	white	carbohydrate acid anilides, esters etc.
Odours	pungent & irritating	Acetic acid, acid halides, etc.
Ignition Test:		Aromatic or aliphatic compound more than four carbon atoms
Heat compound on an oxidised (Coppers foil)	sooty flame	unsaturated or easily available
Test for unsaturation:		oxidisable comp
kmno ₄ Test:		may be present
Add dil. kmno ₄ to comp and shake	Decolourisation	

• Determination of Elements (N, S & Halogens):

Preparation of Lassaigne Filtrate (Sodium Fusion extract)

- Heat small piece of Sodium metal in dry fusion tube till it melts.
- Add small amount of compound to it.
- After that, heat the tube till it red heat and then put it

Teacher's Sign:

Signature

in distilled water take in porcelain dish and covers immediately with asbestos sheet.

iv) Carry out two more & concentrate the contents to half of its volume.

v) Cool & filter. Test for litmus action. It should be basic.

vi) Use the filtrate for the following reactions.

Tests	Observations	Inferences
0.5 cm ³ filtrate + fresh sat. FeSO ₄ , boil, cool & excess dil. H ₂ SO ₄	No green colour	Nitrogen absent
0.5 cm ³ filtrate + 5% Sodium nitroprusside	No violet colour	Sulphur absent
0.5 cm ³ filtrate + conc. HNO ₃ + AgNO ₃	No precipitate	Halogen absent

Conclusion: The compound contains C, H, [O] elements


Determination of functional group of compound:

Group I: Compounds containing C, H, [O] elements

Tests	Observations	Inferences
Test for Carboxylic acid:- i) compound + sat. NaHCO ₃	Soluble with brisk effervescence	Carboxylic acid -COOH present
ii) compound + H ₂ O + neutral FeCl ₃	Yellow colour	Cinnamic acid

Conclusion: The compound contains Carboxylic acid functional group

• Physical Constant:

melting point	Name & Structure of compound
133°C	Cinnamic acid  <chem>C=CC(=O)Oc1ccccc1</chem>

EXPERIMENT:

No.

Date
Page/ /
8

Identification of organic compound - II (Coarsely soluble Acid)

Preliminary Test:

Tests	observations	Inferences
Nature	solid	Carbohydrate, phenol, acids, amines, etc.
Colour	white	may be present
Odour	pungent & irritating	Aromatic, acids, amide anilides, ketones etc.
Ignition test:		Acetic acid, acetic anhydride, etc.
Heat compound on oxidising copper foil.	Sooty flame	Aromatic & aliphatic compound containing more than 4 carbon.
Test for unsaturation		
kmno ₄ test:		unsaturated or easily oxidisable compound
Add dil. kmno ₄ to small amount of compound & shake	Decolourisation	may be present

Detection of Elements (N, S, halogen):

Preparation of Lassaigne filtrate (sodium fusion extract)

- Heat small piece of Sodium metal in dry fusion tube till it melts.
- Add a small amount of compound to molten sodium.
- Heat the fusion tube to red heat & drop it in 5 cm³ distilled water in porcelain dish covering immediately with adhesions sheet.
- Carry out two more & concentrate the content of dish to half in volume.

Teacher's Sign:

Signature

v) cool & filter test the filtrate for litmus action. It should be basic.

vi) use the filtrate for further reactions:

Tests	Observations	Inferences
0.5 cm ³ filtrate + fresh FeSO ₄ , boil, cool & add excess of dil. H ₂ SO ₄	No green colour	Nitrogen absent
0.5 cm ³ filtrate + 5% Sodium nitroprusside	No violet colour	Sulphur absent
0.5 cm ³ filtrate + conc HNO ₃ . Add AgNO ₃	No precipitate	Halogen absent

Conclusions :- The given compound contains C, H, [O] elements.
Determination of functional group of compounds :-
Group I: Compounds containing C, H, [O] elements:

Tests	Observations	Inferences
Test for Carboxylic Acid i) compound + NaHCO ₃ Saturated solution	Soluble with brisk effervescence	Carboxylic acid -COOH present
ii) Compound + H ₂ O + few drops of neutral FeCl ₃	Red colour	Succinic acid

Conclusion :- The given compound contains Carboxylic functional group $\text{Ar}-\text{COOH}$

Physical Constant :-

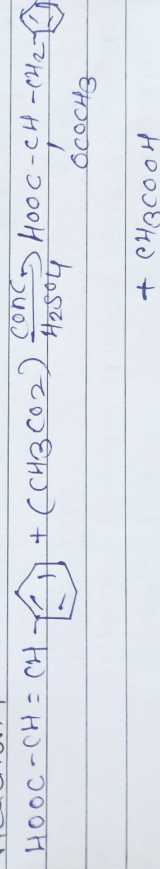
melting point	Name & structure of compound
185°C	Succinic Acid $\begin{array}{c} \text{CH}_2-\text{COOH} \\ \\ \text{CH}_2-\text{COOH} \end{array}$

Derivative of water Insoluble Acid:-
(Acetyl derivative of hydroxy acids)

• Procedure:-

- i) Take 1 g of Compound in dry test tube
- ii) Add 2 cm³ of acetic anhydride + 1 drop of conc. H₂SO₄
- iii) Heat to boiling/cool & pour the content into 10 cm³ of cold water in a dish.
- iv) If solid does not separate out, heat for 2 min cool & shake well
- v) Filter the solid product. wash with H₂O.
- vi) Dry & determine the melting point.

Reaction:-



Physical constant:-

The melting point of acetyl derivative of hydroxy acid is 170°C.

Purification of Compound:-

- i) Purified Compound: water Immiscible Neutral

ii) Method of Purification:- Distillation

iii) Volume of purified product: 2.8 ml

iv) Boiling point of purified product: 202°C

Signature

Teacher's Sign:

RESULTS:-

• Identified compound : I

Compound Identification	Elements Detected	Functional Group	physical constant	Name of structure formation with compound	Derivative prep. melting point
Insoluble Acid	Carbon, Hydrogen, Oxygen	Carboxylic acid -COOH	melting point = 133°C	cinnamic acid	Acetyl derivative of hydroxy acid melting point = 170°C

• Identified compound : II

Compound Identification	Elements Detected	Functional Group	physical constant	Name of compound
Soluble Acid	Carbon, Hydrogen, Oxygen	Carboxylic acid -COOH	melting point = 185°C	Succinic acid

• purified compound :-

purified compound	yield of product	physical constant
Water Immiscible Neutral	2.8 ml	Boiling point = 202°C

Ternary mixture-V

Type:- Liquid-Liquid-solid mixture

Solubility Tests:-

Tests	Observations	Inference
i) mixture + water shake well & allow to stand	a) two layers are formed b) solid does not dissolve c) Aqueous layer is heat & evaporate	water immiscible liquid water insoluble solid water miscible liquid

Conclusion :- The mixture contain water immiscible liquid, water miscible liquid & water insoluble solid.

Determination of chemical type:-

(water immiscible liquid + water miscible liquid + water insoluble solid)

Tests	Observations	Inference
For water insoluble solid		
0.01 g of mixture. 1-2 ml 5% Sol. NaOH. shake till effervescence stops. Filter.	strong effervescence before filtration. Acidifying with conc. HCl \rightarrow solid reappears	Carboxylic acid is present. xylic acid is confirmed.
For water miscible liquid		
0.5 cm ³ liq. + 2 cm ³ H ₂ O		

shake & take waters reactant			
waters extract + sat. NaHCO_3	No strong effervescence		Carboxylic acid absent
WE + aq. FeCl_3 solution	No violet colour		phenol absent
WE + red litmus paper	papers not turn blue		Base absent
None of above tests is positive			waters miscible neutral is present
For waters immiscible liquid			
Liquid + sat. NaHCO_3	No strong effervescence		Carboxylic acid absent
two layers are formed			
Liquid + dilute NaOH excess	Aq. layers + 1:1 H ₂ O		
shake. two layers are formed	→ no two layers		phenol absent
Liquid + 1:1 HCl excess			
shake. two layers formed	Aq. layers + 20% NaOH		Base absent
All the above tests are negative	→ no emulsion		Neutral compound is present

Conclusion :- chemical type of given mixture is

- waters immiscible Neutral
- waters miscible Neutral
- waters insoluble Acid

• Separation of liquid - Liquid - solid mixture :-

A. Separation method :-

Distillation

In Distillation flask

• waters insoluble solid

+ waters immiscible liquid

↓ separating funnel

organic layer

waters immiscible

Neutral

+ sat. NaHCO_3

aqueous layer

• aqueous layer

• solid reappears

• waters insoluble

In collector flask

- volatile liquid

- waters miscible Neutral

No.

EXPERIMENT

Date / /

Page 22

Teacher's Sign:

③. yield of the separating compound :-

i) volume of water immiscible liquid = 8.5 ml

ii) volume of water miscible neutral = 24.5 ml

iii) weight of water insoluble Acid = 0.7 g

Identification of organic compound : I

(water miscible neutral)

Tests	Observations	Inferences
Nature	Liquid	carbohydrates, alcohols, ketones, esters, etc
Colour	Colourless	carbohydrates, esters, alcohols, ketones, etc
Odour	Pleasant	alcohols, etc.
Ignition test :-		
Compound on oxidised	Non sooty flame	Aliphatic compound
Copper foil		
Test for unsaturation		
Kmno ₄ test :-		
Add. dil. kmno ₄ to	No decolourisation	Saturated compound
Small amount of		
the compound + shake		

Determination of Elements (N, S, and Halogens)

Preparation of Lassaigne's Filtrate (Sodium Fusion) :-

- Heat small piece of sodium metal in dry fusion tube till it melts.
- Add small amount of compound to molten sodium. Heat the fusion tube to red heat & then drop it in.

5 cm³ distilled water taken in porcelain dish covering immediately with an asbestos sheet.
 (i) carry out two more fusion & concentrate the content of dish to half of its volume.
 (ii) Cool & filter solution. Test for lithium action. It should be basic.
 (iii) Test the filtrate for following reactions:

Tests	Observations	Inference
0.5 cm ³ filtrate + freshly FeSO ₄ , boil, cool & add excess of dil. H ₂ SO ₄	No green colour	Nitrogen absent
0.5 cm ³ filtrate + 5% Sodium nitroprusside solution	No violet colour	Sulphur absent
0.5 cm ³ filtrate + conc. HNO ₃ . Add AgNO ₃	No precipitate obtained	Halogen absent

Conclusion: The given compound contains C, H, Cl, elements
 Determination of the functional group of compounds:
 Group I: compounds containing C, H, Cl, elements

Tests	Observation	Inferences
Test for alcohols Compound (liquid) in dry test tube + sodium metal	Effervescence due to formation of H ₂ gas	Alcoholic -OH group present

Conclusion: The given compound contains alcoholic functional group.

Physical constant	Name & (structure of compound)	Chemical formula
melting point	ethyl alcohol	C ₂ H ₅ -OH

Identification of organic compound : II

(water immiscible Neutral)

Preliminary tests :

Tests	Observations	Inferences
Nature	Liquid	Carbohydrates, esters, ketones, alcohol, etc.
Colour	Colourless	Ketones, esters, alcohols, aldehydes etc.
Odour		
Ignition Test :	Heat the compound on a sooty flame	Aromatic or aliphatic compounds containing more than 4 carbon.
Test for unsaturation		
Kmno ₄ test :		
Add few drop of dil. Kmno ₄ to small amount of compound & shake		Decolourisation
		unsaturated or easily oxidisable
		may be present

Detection of elements (N, S & halogen) :-

Preparation of Lassaigne filtrate (Sodium fusion extract)

i) Heat small piece of sodium metal in dry fusion tube till it melts.

ii) Add small amount of substance to molten sodium.

Heat the fusion tube to red heat & keep it in 5 cm³ distilled water taken in porcelain dish covering it

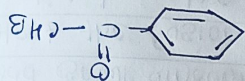
immediately with an asbestos sheet.
 (i) Careg out two more & concentrate the content of dish to half its volume.
 (ii) Cool & filter the solution. Test for litmus action. It should be basic
 (iii) Test the filtrate for the following reaction.

tests	observations	Inferences
0.5 cm ³ filtrate + freshly FeSO ₄ sol. cool & add excess of dil. H ₂ SO ₄	No green colour	Nitrogen absent
0.5 cm ³ filtrate + 5% sodium nitroprusside solution	No violet colour	Sulphur absent
0.5 cm ³ filtrate + conc. HNO ₃ . Add AgNO ₃	No precipitate	Halogen absent

Conclusion :- the given compound contain C, H, [O] element.
 determination of functional group of compound :
 Group I :- compound containing C, H, [O] elements

tests	observation	Inferences
Tests for ketone Compound + NaOH + 2-3 drops of sodium nitro- prusside solution	wine red colour or orange red colours	Lower ketone present
Conclusion :- the given compound contain ketone functional group.		

physical constant :-	Name & structure of compound	Acetophenone
melting point		
boiling point		
20.2°C		



Derivative of water miscible Neutral (Iodoform derivative of aldehyde & ketones)

EXPERIMENT:

No.

Date / /

Page 24

Procedure:-

1) Take 1 cm³ of compound in small 100 cm³ conical flask and add to it 8 cm³ 2 N NaOH solution.

2) Now add saturated iodine solution with constant stirring till pale yellow colour of solution persists.

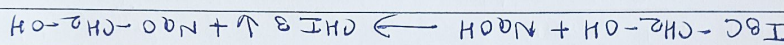
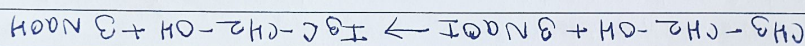
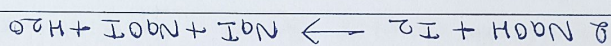
3) Now heat the flask on boiling water bath for 10-15 min.

4) If yellow colour disappears, then add little more of iodine solution.

5) Cool and filter the solid product, wash it with H₂O & recrystallise from alcohol.

6) Filter dry & determine melting point.

Reactions:-



Physical constant:-

The melting point of derivative Iodoform of alcohol is 119°C.

Purification of compound:-

Purified compound: water insoluble Acid

Method of purification: Recrystallization

- solvent used for purification: water
- yield of purified product: 0.6 g
- melting point of product: 120°C

~~2014~~

purified compound	yield of product	physical constant
purified compound	0.6 g	melting point 120.5°C
water insoluble		acid

Compound	Elements	Functional group	Physical constant of compound	Name + structure
ester	Carbon c, lower	Boiling point = 202°	Acetophenone	<chem>CC(=O)c1ccccc1</chem>
Immiscible	Hydrogen H	Ketone		
Neutral	Oxygen (o)	group		

(II): product compound

Compound	Elements	Functional group	Physical property	Name of compound	Derivative prepared with melting point
water	Carbon, Aliphatic	Melting point =	Ethyl	Todoform deriva-	
Miscible	Hydrogen	Alcohol		Alcohol	Alcohol
Neutral	Oxygen(s)	(-OH) group	78°C	C ₂ H ₅ -OH	melting point = 119°C

I: purified compound

Results :-

Type :- Liquid - Liquid - Solid mixture

Solubility Tests :-

Tests	Observations	Inferences
1) Mixture + H ₂ O	a) Solid does not dissolve in H ₂ O.	Water insoluble
Shake & allow to stand	b) Two layers are formed.	Water insoluble
1) Mixture on water	The quantity of liquid present.	Water miscible
Stress & check after some time	Mixture decreased	Water miscible
	gives no layer	Water miscible
	in aqueous solution	Water miscible

Conclusions :- The compounds in the mixture are water insoluble liquid, water miscible liquid & water insoluble solid

Detection of chemical type :-

(Water insoluble liquid + water miscible liquid + water insoluble solid)

Tests	Observations	Inferences
-------	--------------	------------

For water Insoluble		
Solid		
0.01 g mixture + 1.2 cm ³		
1) Bat. NaHCO ₃ Shake till effervescence stop.	No strong effere	Carboxylic acid
Effervescence stop.	ce solid does not	
Filter	reappear	

1) Residue + NaHCO ₃ residue	Acidifying with 1:1 HCl → solid	phenol is present
Residue + 10% NaOH solution filter	reappears	
Teacher's Sign:		

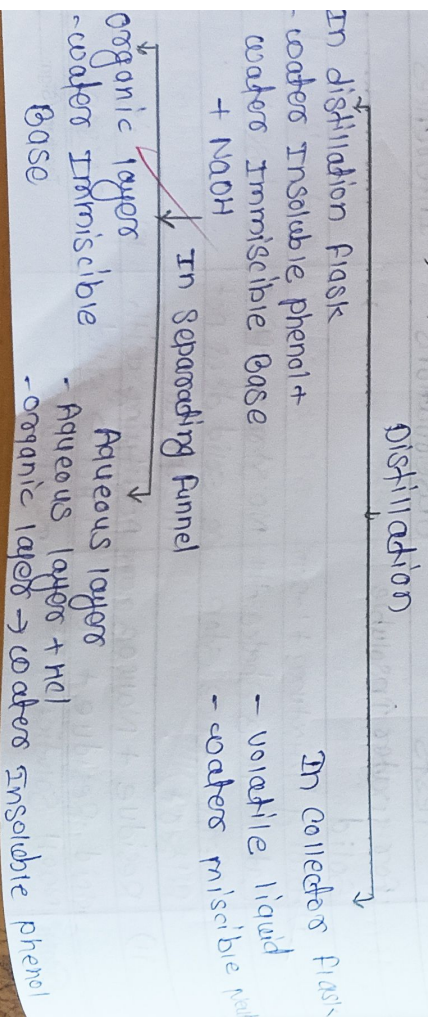
For water miscible liquid		
water extract (WE) + sat. NaHCO ₃	No strong effervescence	carboxylic acid absent
WE + aa FeCl ₃	No blue colour	phenol is absent
WE + red litmus paper	paper not turn blue	base is absent
None of above tests is positive		Neutral is present
For water immiscible liquid		
Liq + NaHCO ₃ , two layers	No effervescence Aq. + 1:1 HCl → no layer	carboxylic acid absent
Liq + dil. NaOH Shake	Aq. + 1:1 HCl → no emulsion	phenol absent
two layers are formed		
Liq + 1:1 HCl. Shake	Aq. + 20% NaOH → gives emulsion	base present
two layers		

Conclusions : Chemical type of mixture are :-

- i) water immiscible base
- ii) water miscible Neutral
- iii) water insoluble phenol

Separation of liquid-liquid-solid mixture :-

A. separation method



B. yield of the separating compound :-

- i) volume of water immiscible Base = 2.8 ml
 ii) volume of water miscible Neutral = 3.5 ml
 iii) weight of water insoluble phenol = 6.6 g

Identification of organic compound : I
(water miscible Neutral)Preliminary tests :-

Tests	Observations	Inferences
Nature	Liquid	Alcohols, ketones, aldehyde, etc. may be present
Colour	Colourless	Amides, anilides
Odour	Fruity	alcohols, ketones etc Aromatic hydrocarbons esters, etc.
Ignition Test :-		
Heat compound on an oxidised copper foil.	No sooty flame	Aliphatic compound
Test for unsaturation		
kmno ₄ Test :-	No decolorisation	Saturated compound
Add dil. kmno ₄ to compound & shake		

• Detection of Elements (N, S & halogen) :-

- Preparation of Lassaigne filtrate (Sodium fusion extract)
- Heat small amount of Sodium in dry fusion tube till it melts.
 - Add small amount of compound to molten Sodium.

iii) Heat it again till it becomes red hot & drop it in distilled water taken in porcelain dish immediately covering it with asbestos sheet.

iv) Carry out two more & concentrate the contents to its half of volume.

v) Cool & filter. Test for litmus action. It should be basic.

vi) Test the filtrate for following reactions.

Tests	Observations	Inferences
0.5 cm ³ filtrate + Fresh FeSO ₄ sol, cool + dil. H ₂ SO ₄ in excess	No green colour	Nitrogen absent
0.5 cm ³ filtrate + 2-3 drops 5% Sodium nitro-prusside	No violet colour	Sulphur absent
0.5 cm ³ filtrate + conc. HNO ₃ Add AgNO ₃	No precipitate	Halogen absent

Conclusion: The given compounds contain C, H, [O] elements

• Determination of functional group of compounds :-

Group I :- Compounds containing C, H, [O] elements

Tests	Observations	Inferences
Test for ketone Compound + NaOH + 2-3 drops of Sodium nitro prusside solution	wine red colour	Lower ketone present

Conclusion :- The given compound has ketone functional group.

Physical constant :-

Boiling point	Name & structure of compound
80°C	Ethyl methyl ketone $\text{H}_3\text{C}-\overset{\text{O}}{\underset{\text{ }}{\text{C}}}-\text{CH}_2-\text{CH}_3$

Identification of organic compound : II (water immiscible base)

• Preliminary Test :-

Tests	Observations	Inferences
Nature	Liquid	Alcohols, ketones, esters, ethers, etc.
Colour	yellow	may be present nitro compound etc.
Odour	Fishy	Amines, aniline, etc
Ignition test :-	Sooty flame	Aromatic compound containing more than four carbon atoms.
Heat the compound on an oxidised copper foil		
Test for unsaturation		
kmno ₄ test :-		
Add dil kmno ₄ to small amount of compound & shake	Decolourisation	unsaturated or easily oxidisable compound may be present.

• Detection of Elements (N, S and halogen) :-

Preparation of Lassaigne Filtrate (Sodium Fusion extract)

- Heat small piece of Sodium metal in dry fusion tube till it melts.
- Add dry substance to the molten Sodium.
- Heat the tube to red heat & drop it in distilled water taken in porcelain dish covering it immediately with an asbestos sheet.
- Carry two more fusions & concentrate the content of dish to half its volume.

v) cool & filter. Test the filtrate for litmus action. It should be basic

vi) Test the filtrate for following reactions:

Tests	Observations	Inferences
0.5 cm ³ filtrate + FeSO ₄ fresh boil, cool & dil.	Green colour	Nitrogen present
H ₂ SO ₄ excess		
0.5 cm ³ filtrate + drop of 5% Sodium nitroprusside	No violet colour	Sulphur absent
0.5 cm ³ filtrate + conc. HNO ₃ Add AgNO ₃	No precipitate	Halogen absent

conclusions :- The given compound contain C, H, [O] element.

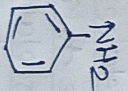
• Determination of functional group of compounds:-

Group II:- compounds containing C, H, [O] & N elements:

Tests	Observations	Inferences
Test for amines:- Dissolve compound in dil. HCl, cool in ice + cold 2% NaNO ₂ solution	A clear solution which when added to solution of β -naphthol in NaOH gives orange red dye	Aromatic primary amines (-NH ₂) group present.

Conclusions :- The given compound contain Aromatic primary amino (-NH₂) group.

Physical constant :-

Melting point / Boiling point	Name & Structure of compound
183°C	Aniline 

- Derivative of ester miscible neutral :-

(Iodoform derivative of aldehyde & ketones) :-

Preparation :-

- Take 1 cm³ compound in conical flask & add 3 cm³ of 2 N NaOH solution.
- Add. hot iodine solution with constant stirring till pale yellow colour of solution persists.
- Heat the flask on boiling water bath for 10-15 min.
- If yellow colour disappears, add little more of iodine.
- Cool & filter the solid product wash it with H₂O & recrystallise it from alcohol.
- Filter, dry & determine melting point.

- Reactions :-

- $2 \text{NaOH} + \text{I}_2 \rightarrow \text{NaI} + \text{NaOI} + \text{H}_2\text{O}$
- $\text{CH}_3 - \underset{\text{O}}{\underset{\parallel}{\text{C}}} - \text{CH}_2 - \text{CH}_3 + 3 \text{NaOI} \rightarrow \text{I} \underset{\text{O}}{\underset{\parallel}{\text{C}}} - \text{CH}_2 - \text{CH}_3 + 3 \text{NaOH}$
- $\text{I} \underset{\text{O}}{\underset{\parallel}{\text{C}}} - \text{CH}_2 - \text{CH}_3 + \text{NaOH} \rightarrow \text{CH}_3 \text{I} \& \text{CH}_3 - \underset{\text{O}}{\underset{\parallel}{\text{C}}} - \text{ONa}$

Physical constant :-

The melting point of iodoform derivative is

121°C

Purification of compound :-

- Purified compound : water insoluble phenol

- Method of purification :- Recrystallization

iii) solvent used for purification : water

iv) yield of purified product : 0.4 g

v) melting point of product : 123°C

EXPERIMENT: No.

Date / /
Page 30

Results:

• Identified compound: I

Compound	Elements Detected	Functional Group	Physical Constant	Name & Structure	Derivative preparation with compound
Water	Carbon, Hydrogen	ketone group	Boiling point $\approx 80^\circ\text{C}$	Ethyl methyl ketone	iodoform test
Miscible	Hydrogen				
Neutral	Oxygen (O)				

Identified compound: II

Compound	Elements Detected	Functional Group	Physical Constant	Name & Structure
Identified	Detected	Group		
Water	Carbon C, Hydrogen H, Oxygen (O)	Aromatic primary amine (-NH ₂)	melting point $\approx 183^\circ\text{C}$	Aniline <chem>Nc1ccccc1</chem>
Base				
		Group		

Purified compound:

Purified compound	Yield of compound	Physical constant
Water insoluble phenol	0.4 g	melting point $\approx 128^\circ\text{C}$

Teacher's Sign: _____

EXPERIMENT:

No. 7

Date / /
Page 31

Ternary mixture-VIII

Type :- Liquid - Liquid - Liquid mixture

Solubility Test :-

Tests	Observation	Inferences
Take mixture in a watch glass and wait for few minutes	Volume of quantity of mixture is decreased	volatile liquid is miscible liquid present.
mixture + H ₂ O, shake well and stand for 10 min	three layers are observed	two waters immiscible liquid is present.

Conclusion :- The mixture contains water miscible liquid and 2 waters immiscible liquid

Determination of chemical type:-

(water miscible liquid + water immiscible liquid + water immiscible liquid)

Tests	Observation	Inferences
For water miscible liquid		
i) CoE + sat. NaHCO₃	no effervescence	Acid absent
ii) CoE + aq. FeCl₃	No violet colour	phenol absent
iii) WE + red litmus	Not turn blue	base absent
iv) none of the above test is positive	-	Neutral present
For water miscible liquid		
i) Liq + sat NaHCO₃	No effervescence	

Gulshan

Teacher's Sign: _____

shake. Two layers are formed	No two layers	Acid absent
Liq + dil NaOH excess Two layers are formed	Aqueous layers + 1:1 HCl \rightarrow no emulsion	phenol absent
ii) Liq + 1:1 HCl excess shake. Two layers are formed	Aqueous layers + 20% NaOH \rightarrow emulsions obtained	Base present
iii) All the above tests are negative	—	Neutral present

conclusions: the given mixture contain chemical Type :-

- i) water miscible neutral
- ii) water immiscible base
- iii) water immiscible Neutral

• Separation of Liquid - Liquid - Liquid mixture :-

A) separation method

Distillation

In distillation flask

2 water immiscible liquid

+ HCl

In collector's flask

= volatile liquid

- water miscible

neutral

In separating funnel

organic layers

- water immiscible

neutral

Aqueous layers

Aqueous layers

+ NaOH

organic layers

- water immiscible

base

Aqueous layers

B. Yield of the separating compound :-

i) volume of water miscible Neutral = 3 ml

ii) volume of water immiscible Base = 3.5 ml

iii) volume of water immiscible Neutral = 2.8 ml

EXPERIMENT:

No.

Date / /

Page 32

- Identification of organic compound : I
(water miscible Neutral)

Tests	Observations	Inferences
Nature	liquid	lower aromatic hydrocarbon, alcohol ethers etc.
Colour	Colourless	Amides, esters, alcohol ketones etc.
Odour	Pleasant	Alcohols, etc.
Ignition Test :- Heat compound on an oxidised copper foil.	No sooty	Aliphatic compound etc.
Test for unsaturation kmno ₄ test :- Add. dil kmno ₄ to compound & shake	No decolourisation	Saturated compound present.

Determination of elements (N, S and halogens) :-

preparation of Lassaigne filtrate (sodium fusion extract)

- Heat small piece of sodium metal in dry fusion tube till it melts.
- Add dry substance to the molten sodium.
- Heat it further to red heat & then drop it in a distilled water taken in a porcelain dish covering it immediately with an asbestos sheet.
- Carry out two more fusion & concentrate the contents to half its volume.
- Cool & filter test for litmus action. It should be basic.

vi) Test the filtrate for the reactions.

Tests	Observations	Inferences
0.5 cm ³ filtrate + prop. freshly sat. FeSO ₄ , boil, cool & add excess dil. H ₂ SO ₄	No green colour	Nitrogen absent
0.5 cm ³ filtrate + 5% sodium nitroprusside	No violet colour	Sulphur absent
0.5 cm ³ filtrate + conc. HNO ₃ + AgNO ₃ solution	No precipitate	Halogen absent

Conclusion :- The given compound contain C, H, [O] element

Determination of the functional group of compound :-

Group I: Compounds containing C, H [O] elements.

Tests	Observation	Inferences
Test for alcohols :- Compound (if liq) + sodium dry + test tube	Effervescence due to formation of CH ₄ (g)	Alcoholic -OH group present.

Conclusion :- The given compound contain alcoholic functional group.

Physical constant :-

melting point boiling point 78°C	Name & structure of the compound Ethyl alcohol CH ₃ -CH ₂ -OH
--	---

Identification of organic compound : I
(water immiscible neutral)

Tests	Observations	Inferences
Nature	Liquid	Alcohols, ketones, esters, ethers, etc may be present.

EXPERIMENT:

No.

Date / /
Page 33

Colours	white	Amides, anilides, ketones, esters, alcohols etc.
Odour	Sweet, strong	ketones, anilides etc.
Ignition Test: Heat comp. on an oxidised foil of copper.	Sooty flame	Ar. comp or aliphatic comp. containing more than 4-C
Test for unsaturation KMnO_4 test :-		
Add. dil KMnO_4 to small amount of compound & shake	Decolourisation	unsaturated or easily oxidisable compound may be present.

- Detection of elements (N, S and halogen) :-
Preparation of Lassaigne filtrate (sodium fusion extract):

- Heat freshly sodium metal in dry fusion tube till it melts.
- Add small amount of dry substance to molten sodium
- Heat it to further to red heat & drop it in distilled water taken in porcelain dish covering immediately with an asbestos sheet.
- Carry to more fusions & concentrate. The contents of dish to half its volume.
- Cool & filter. Test for litmus action. It should be basic.

Tests	Observations	Inference
0.5 cm ³ filtrate + Fresh sat. FeSO ₄	No green colour	Nitrogen absent

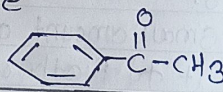
boil, cool add excess dil. H_2SO_4		
0.5 cm ³ filtrate + 5% sodium nitro-prusside solution	No violet colour	Sulphur absent
0.5 cm ³ filtrate + conc. HNO_3 + $AgNO_3$ solution.	No precipitate	Halogen absent

Conclusions: The given compound contains C, H, [O] elements.
 • Determination of the functional group of compounds:
 Group I: compounds containing C, H, [O] elements.

Tests	Observations	Inferences
Test for ketone Compound + NaOH + sodium nitroprusside solution	Orange red colour	Lower ketone present

Conclusion: The given compound contain ketone functional group

• Physical constant

Boiling point	Name & Structure of the compound
202°C	Acetophenone 

Derivative of waters miscible Neutral:
 (Acetyl derivative of alcohols)

• Preparation:-

- Take 0.5 cm³/g of the compound taken in dry hand glass test tube, add 2 cm³ of acetic anhydride and 2-3 drops of conc. Sulphuric acid.

EXPERIMENT:

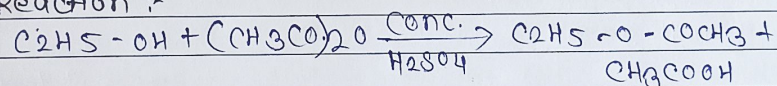
No.

Date / /

Page 34

- ii) warm the test tube on water bath for 10-15 min.
- iii) cool & pour in 20 cm³ cold-water. product will separate out.
- iv) filter the product, recrystallise it from alcohol.
- v) filter, dry & determine the melting point.

• Reaction :-



• physical constant :-

The melting point of acetyl derivative of alcohol is 114°C

• purification of compound :-

- i) purified compound :- water immiscible base
- ii) method of purification : Distillation
- iii) volume of purified product :- 2.6 ml
- iv) Boiling point of purified product :- 184°C

Teacher's Sign: _____

EXPERIMENT:

No.

Date / /

Page 35

• Results :-

Identified compound : I

Compound Identification	Elements Detected	Functional Group	Physical Constant	Name & Structure of compound	Derivative preparation with melting point
Waters miscible	Carbon C, Hydrogen H	Alcoholic -OH group	melting point = 78°C	Ethyl alcohol <chem>CCO</chem>	Acetyl derivative of alcohol melting point = 114°C

Identified compound : II

Compound Identification	Elements Detected	Functional Group	Physical Constant	Name & Structure of compound
Waters Immiscible	Carbon C, Hydrogen H	Lower ketone group	Boiling point = 202°C	Acetophenone <chem>CC(=O)c1ccccc1</chem>

• purified compound :-

Purified Compound	Yield of product	Physical constant
Waters Immiscible Base	2.6 ml	Boiling point = 184°C

Figure

Teacher's Sign:

EXPERIMENT: No. 8 Ternary mixture Date / /

Type :- Liquid-Liquid-Liquid mixture
So

Solubility Test :-

Tests	Observations	Inferences
Take a mixture in watch glass and wait for few minutes	Quantity of mixture is not decrease	So volatile liquid is absent.
mixture + H ₂ O. Shake well and stand for 10 minutes	Three layers are formed	3 water immiscible liquid is present.

Conclusion :- The compounds in the given mixture are three water immiscible liquid.

Determination of chemical Type :-

(water immiscible liquid + water immiscible liquid + water immiscible liquid)

Tests	Observations	Inferences
For water immiscible liquid		
i) Liq + sat. NaHCO ₃ Shake. two layers are formed.	Aq. layers + 1:1 HCl → no two layers	Carboxylic acid is absent.
ii) Liq + dil. NaOH excess Shake. two layers are formed.	Aq. layers + 1:1 HCl → emulsion formed	Phenol is present.
iii) Liq + 1:1 HCl excess Shake. two layers are formed.	Aq. layers + NaOH → emulsion formed	Base is present
iv) All the above tests are negative		Neutral is present

Swabhi

Teacher's Sign:

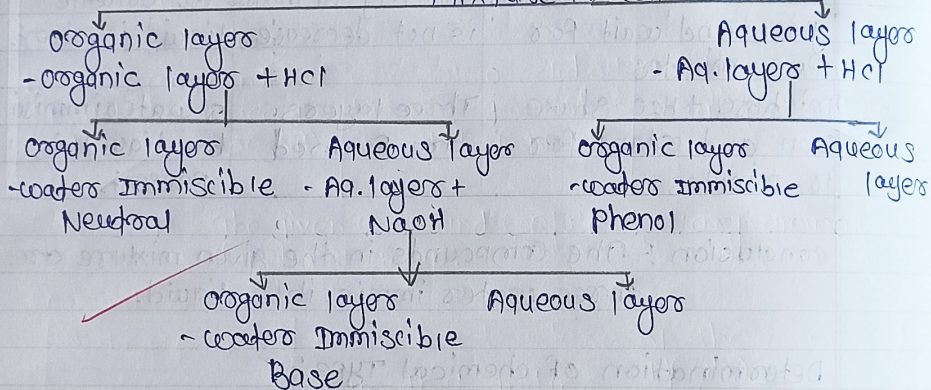
Conclusion :- The chemical type of given mixture :-

- i) water Immiscible phenol
- ii) water Immiscible Base
- iii) water Immiscible Neutral

Separation of Liquid - Liquid - Liquid mixture :-

A. Separation method -

In separating funnel
Mixture + NaOH



B. yield of the separating compound :-

- i) volume of water immiscible phenol = 3.7 ml
- ii) volume of water immiscible Base = 3.5 ml
- iii) volume of water immiscible Neutral = 2 ml

Identification of organic compound :-

(water Immiscible Base)

• Preliminary Tests :-

Tests	observations	Inferences
Nature	liquid	Alcohols, ketones/esters, ethers etc. may be present.
Colour	Yellow	Nitro compounds quinones etc.

odours	Fishy	Anilines, amines etc.
Ignition Test: Heat compound on an oxidised copper foil	Sooty	etars. comp. or aliphatic compounds containing more than 4-C atoms.
Test for unsaturation		
kmno ₄ Test:-		unsaturated or
Add few drops of very dil. kmno ₄ to compound and shake	Decolourisation	easily oxidisable compound may be present.

Detection of Elements (N, S, halogen):-

Preparation of Lassaigne Filtrate (Sodium Fusion extract)

- Heat piece of sodium metal in dry fusion tube till it melts.
- Add small amount of dry substance to molten sodium.
- Heat it to red hot and drop it in distilled water taken in a porcelain dish covering immediately with asbestos sheet.
- Carry out two more fusion & concentrate the content in half its volume.
- Cool & filter. Test for litmus action. It should be basic.
- Test the filtrate for the reactions.

Tests	Observations	Inferences
0.5 cm ³ Filtrate + fresh FeSO ₄ soln, cool + dil. H ₂ SO ₄ excess	Green Colour	Nitrogen present
0.5 cm ³ Filtrate + 5% Sodium nitroprusside	No Violet colour	Sulphur absent

0.5 cm³ filtrate + conc.
HNO₃ + AgNO₃ solution

No precipitate

Halogen absent

Conclusion: The given compound contains C, H, [O], N elements.

• Determination of the functional group of compound:
Group I: compounds containing C, H, [O] + N elements.

Tests	Observations	Inferences
Test For Amines:- Dissolve compound in dil. HCl cool in ice + add 2% NaNO ₂ sol ⁿ	pale yellow solid oil turning greenish on addn of NaOH	tertiary amino group present (N ⁺)

Conclusion: The given compound contains tertiary amino functional group.

Physical constant:

Boiling point	Name & structure of the compound
198°C	dimethyl aniline <chem>CN(C)c1ccccc1</chem>

Identification of organic compound: II
(water immiscible neutral)

• preliminary tests -

Tests	Observation	Inferences
Nature	Liquid	Lowers aromatic hydrocarbon alcohol, ketones etc. may be present
Colour	Whitish yellow	Aromatic hydrocarbons, amides etc.
Odours	Bitters almonds	Nitro compounds, aromatic aldehyde etc.

EXPERIMENT:

No.

Date

Page

38

Ignition Test :-

Heat compound on oxidised copper foil.

Sooty flame

Pro. comp. or alpha-
dic compounds
containing more
than 4-C atoms

Test for unsaturation:

KMnO₄ Test :-Add dil. KMnO₄ to compound & shake

Decolourisation

unsaturated or
easily oxidisable
compound may
be present.

- detection of elements (N, S & halogens) :-

preparation of Lassaigne Filtrate (sodium fusion extract)

- Heat the sodium metal in dry fusion tube till it melts
- Add small amount of dry substance to molten sodium.
- Heat it to red heat & drop it in distilled water taken in porcelain dish covering it immediately with an asbestos sheet.
- Carry out two more fusions & concentrate the contents of dish to half its volume.
- cool & filter. Test the litmus action. It should be basic.

- Test the filtrate for the following reactions.

Tests	Observations	Inferences
0.5 cm ³ filtrate + fresh FeSO ₄ soln, cool & add excess dil. H ₂ SO ₄	Green colour	Nitrogen absent
0.5 cm ³ filtrate + 5% sodium nitroprusside	No violet colour	Sulphur absent

0.5 cm ³ filtrate + conc. HNO ₃ + AgNO ₃	No precipitate	Halogen absent
---	----------------	----------------

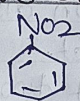
Conclusion :- The given compound contain C, H, [O], N elements.

- determination of functional group of compounds :-
Group :- compounds containing C, H, [O], N elements.

Tests	Observations	Inferences
Test for hydrocarbon Dissolve 2-3 drop of compound in benzene + 2 cm ³ dil. I ₂ in benzene Shake well	Remains violet in colour	Hydrocarbon present

Conclusion :- The given compound contain hydrocarbon functional group.

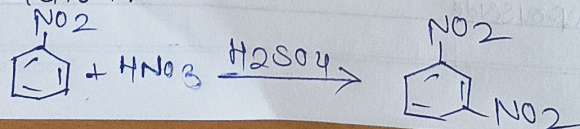
Physical constant :-

Boiling point	Name & structure of compound
210°C	Nitrobenzene 

Derivative of water Immiscible Neutral :-
Preparation :-

- Take compound in dry test tube.
- Add conc. HCl to it. Add pinch of Zn dust then boil & cool it.
- Add water and then NaOH solution drops of this solution to NaCl solution.
- violet colour is produced
- on warming with fuming HNO₃ & H₂SO₄ gives m-dinitro benzene.

Reaction :-



EXPERIMENT:

No.

Date

Page 39

physical constant :-

The melting point of derivative of water immiscible Neutral is 90°C .

purification of compound :-

- i) purified compound : water immiscible phenol.
- ii) method of purification : distillation
- iii) yield of purified product : 3 ml
- iv) Boiling point of product : 182°C

EXPERIMENT:

No.

Date

Page

/ /
60

Results:-

• Identified Compound :- I

Compound Identification	Elements Detected	Functional Group	Physical Constant	Name & Structure of compound
soluble in water immiscible in base	Carbon, C Hydrogen, H Oxygen, (O) Nitrogen, N	Tertiary amino group	Boiling point = 193°C	N,N-dimethylaniline <chem>CN(C)c1ccccc1</chem>

• Identified compound :- II

Compound Identification	Element Detected	Functional group	Physical constant	Name & Structure of compound	Derivative Preparation with melting point
soluble in water immiscible in base Neutral	Carbon, C Hydrogen, H Oxygen, (O) Nitrogen, N	Hydrocarbon	Boiling point	Nitrobenzene <chem>[O-][N+](=O)c1ccccc1</chem>	Nitro derivative melting point = 5°C

• purified compound

purified compound	yield of compound	Physical constant
soluble in water immiscible in base phenol	3 ml	Boiling point = 182°C

~~DATE~~